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Item 8 #2920

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EFFLUENT AND ENVIRONMENTAL MONITORING AND REPORTING

AEC MANUAL CHAPTER 0513

REPORT FOR PERIOD JULY - DECEMBER, 1971

UNION CARBIDE CORPORATION

NUCLEAR DIVISION

OAK RIDGE GASEOUS DIFFUSION PLANT

Safety, Health Physics, and
Industrial Hygiene Departments

January 6, 1972

OAK RIDGE GASEOUS DIFFUSION PLANT

IDENTIFICATION OF FACILITY

The Oak Ridge Gaseous Diffusion Plant of the United States Atomic Energy Commission is a complex of production, research, development, and supporting facilities, distributed over a 640-acre area of eastern Tennessee. The primary mission of the plant is the enrichment of uranium hexafluoride in the uranium-235 isotope, with the performance of other atomic energy related activities as required by the Commission. To accomplish these assignments a physical plant has been constructed at an initial capital cost of about $815,000,000. The principal process facilities are the five gaseous diffusion cascade buildings, portions of which are now in standby. These are supplemented by about 70 support buildings and facilities (maintenance, supply stores, administration, cafeteria, data processing, etc). Since its inception, Union Carbide Corporation Nuclear Division has been responsible for operating the Oak Ridge Gaseous Diffusion Plant. Present employment is about 2,800 and the annual payroll is approximately $28,000,000.

APPLICABLE STANDARDS

ANALYSES	GUIDES	REFERENCE FOR GUIDES
A. Air Quality Standards		
Fluoride	4.5 ppb (12 hours) 3.5 ppb (24 hours) 2.0 ppb (7 days) 1.5 ppb (30 days)	Tennessee Air Pollution Control Regulations
B. Water Quality Standards		
Chromate	0.05 ppm	USPHS Drinking Water Standard
Fluoride	1.0 ppm	USPHS Drinking Water Standard
Nitrate	45.0 ppm	USPHS Drinking Water Standard
Uranium	$2{,}000 \times 10^{-8}$ µCi/ml	AEC Manual Chapter 0524

C. Food Sources

No ORGDP input required.

D. Standards for Flora and Fauna

Applicable standards have not been established.

SAMPLE COLLECTION AND ANALYSIS SUMMARY

A. Air

1. Radioactive

No ORGDP input required.

2. Non-radioactive

ORGDP Environmental Air Samples (Fluorides) are taken over a 24 hour period at the following locations and analyzed using the colorimetric method: (Figure I) Table (IV-A-2)

a. K-901 - The sample site is one mile southwest of the ORGDP at the raw water intake from the Clinch River for the Sanitary Water Treatment Plant.

b. K-1206-D - The sample site is one mile northeast of the ORGDP at a water storage tank.

c. K-805 - The sample site is on a ridge one mile southwest and overlooks the ORGDP.

d. K-25 Credit Union - The sample site is at the former K-25 Credit Union Building five miles northeast of the ORGDP on the Oak Ridge Turnpike.

e. Blair Road - The sampling site is one mile northeast of the ORGDP where a safety billboard sign was formerly located.

f. Watts Bar Lake - The sample site is five miles southwest of the ORGDP on an inlet of the Emory River.

B. Water and Sediments

1. Radioactive

Data from existing sample points are Poplar Creek Upstream of the ORGDP; Poplar Creek Downstream from ORGDP waste line discharges; and Clinch River Downstream from Poplar Creek Junction. Analyses for uranium employs the fluorometric method. (Figure 2) Table (IV-B-1)

a. Poplar Creek in Main Branch - This sample site, one mile north-northeast of the ORGDP, is upstream of liquid effluents discharged from the ORGDP. One gallon semiannual dip samples of water are taken at this location.

b. Poplar Creek at Clinch River - This sample site, one mile west-southwest of the ORGDP, reflects the liquid effluents discharged from the ORGDP. One gallon semiannual grab samples of water are taken at this location.

c. CRM 11.5 - This sampling site, on the Clinch River, is one mile west of the ORGDP at Clinch River Mile 11.5 and is downstream of ORGDP's Poplar Creek discharge. Water samples are collected at this point on a continuous basis and are composited over a three-month period.

2. Non-radioactive

Locations as in B-1 above for chromate, nitrate, fluoride and pH. Analyses are by atomic absorption for chromate, wet chemical for nitrate, specific ion electrode for fluoride and pH. (Figure 2) Table (IV-B-2)

C. Food Sources

No ORGDP input required.

D. Fauna, Flora, and Soil

1. Radioactive

Data from five sampling sites at five mile radius from ORGDP. Semi-annually the soil, pine needles and grasses are analyzed on a dry basis for fluorides; and pine needles and grasses for uranium using the following methods: Uranium - Fluorometric; Fluoride - Colorimetric. (Figure 3) Table (IV-D-1).

a. Lawnville - This sample site is five miles southwest of the ORGDP on Lawnville Road one mile north of Interstate Highway #40.

b. Buttermilk Road - This sample site is five miles southeast of the ORGDP on Buttermilk Road at Paw Paw Creek, one mile south of White Wing Road.

c. Mt. Pisgah - This site is five miles northeast of the ORGDP on the old Harriman Highway, at Massengill Spring Branch one mile south of Highway #61.

d. Highway #61 - This sampling site is five miles northwest of the ORGDP and is located at the point where Highway #61 crosses the Little Emory River.

e. Credit Union - This sampling site is five miles northeast of the ORGDP at the former K-25 Credit Union Building on the Oak Ridge Turnpike.

2. Non-radioactive

Data on grass fluoride content. (Figure 3) Table (IV-D-2)

TABLE IV - A - 2

AIR MONITORING DATA - FLUORIDES

JANUARY - JUNE, 1971

Location	No. of Samples[a]	Units of ppb			% AQS[d]
		Maximum[b]	Minimum[c]	Average	
K-901	25	2.2	0.4	0.90	26%
K-1206-D	25	1.5	< 0.2	0.63	18%
K-805	25	1.8	< 0.2	0.57	16%
Blair Road	24	1.9	< 0.2	0.95	27%
K-25 Credit Union	25	1.5	< 0.2	0.68	19%
Watts Bar Lake	23	1.1	< 0.2	0.47	13%

JULY - DECEMBER, 1971

K-901	20	2.5	0.2	0.98	28%
K-1206-D	20	2.2	0.3	1.02	29%
K-805	20	1.7	0.3	1.02	29%
Blair Road	20	1.8	0.2	1.01	29%
K-25 Credit Union	20	1.1	< 0.2	0.74	21%
Watts Bar Lake	20	1.1	< 0.2	0.62	18%

[a] Sample duration—24 hours

[b] Maximum—24-hour concentration

[c] Minimum—24-hour concentration

[d] Air Quality Standard (AQS)—3.5 ppb by volume for 24 hours (Tennessee Air Pollution Control Regulations)

TABLE IV - B - 1

URANIUM CONCENTRATION IN POPLAR CREEK AND CLINCH RIVER

JANUARY - JUNE, 1971

Location	No. of Samples	Units of 10^{-8} µCi/ml			% RPS[c]
		Maximum	Minimum	Average	
PC/Main Branch	1[a]	-	-	1.0	< 0.1%
PC @ CR	1	-	-	1.3	< 0.1%
CRM 11.5	2[b]	0.6	0.4	0.5	< 0.1%

JULY - DECEMBER, 1971

PC/Main Branch	1	-	-	4.0	0.2%
PC @ CR	1	-	-	13.0	0.7%
CRM 11.5	2	0.2	0.0	0.1	< 0.1%

(a) Normal sampling frequency—semiannual grab sample

(b) Normal sampling frequency—continuous, composited over three-month period

(c) RPS is 2,000 x 10^{-8} µCi/ml (AEC Manual, Chapter 0524, Appendix, Annex A, Table II)

TABLE IV - B - 2

NONRADIOACTIVE QUALITY OF WATER

JANUARY - JUNE, 1971

Location	No. of Samples[a]	NO_3 mg/l	NO_3 % Guide[b]	F mg/l	F % Guide[c]	Cr^6 mg/l	Cr^6 % Guide[d]	pH[e]
PC/Main Branch	1	1.0	2%	0.2	20%	<0.04	<80%	7.7
PC @ CR	1	3.0	7%	0.2	20%	<0.04	<80%	8.0
CRM 11.5	1	2.0	4%	0.2	20%	<0.04	<80%	7.8

JULY - DECEMBER, 1971

PC/Main Branch	1	2.0	4%	0.3	30%	<0.04	<80%	7.5
	1	1.5	3%	0.3	30%	<0.04	<80%	7.6
	1	2.4	4%	0.3	30%	<0.04	<80%	7.7

[a] Normal sampling frequency—semiannual grab sample

[b] Guide for NO_3—45 ppm (USPHS - Drinking Water Standard)

[c] Guide for F—1.0 ppm (USPHS - Drinking Water Standard)

[d] Guide for Cr^6—0.05 ppm (USPHS - Drinking Water Standard)

[e] Guide for pH—6.5 - 8.5 (Tennessee Fish and Aquatic Life)

TABLE IV - D - 1

URANIUM IN SOIL, PINE NEEDLES, AND GRASSES
AT FIVE-MILE RADIUS FROM ORGDP

JANUARY - JUNE, 1971

Location	Units of 10^{-8} µCi/gram			
	No. of Samples[a]	Soil[b]	Pine Needles	Grass
Lawnville (SW)	1	140	20	10
Buttermilk Road (SE)	1	130	7	20
Mt. Pisgah (N)	1	80	7	7
Highway 61 (NW)	1	80	7	40
Credit Union (NE)	1	130	7	7

JULY - DECEMBER, 1971

Lawnville (SW)	1	30	10	70
Buttermilk Road (SE)	1	70	20	50
Mt. Pisgah (N)	1	70	40	30
Highway 61 (NW)	1	90	40	10
Credit Union (NE)	1	80	50	60

(a) Normal sampling frequency—semiannual grab sample

(b) Top two inches; dry basis

NOTE: Applicable guides for flora and fauna have not been established.

TABLE IV - D - 2

FLUORIDE IN PINE NEEDLES AND GRASSES
AT FIVE-MILE RADIUS FROM ORGDP

JANUARY - JUNE, 1971

Location	No. of Samples[a]	Units of ppm	
		Pine Needles	Grasses
Lawnville (SW)	1	14	25
Buttermilk Road (SE)	1	10	21
Mt. Pisgah (N)	1	15	10
Highway 61 (NW)	1	9	20
Credit Union (NE)	1	7	11

JULY - DECEMBER, 1971

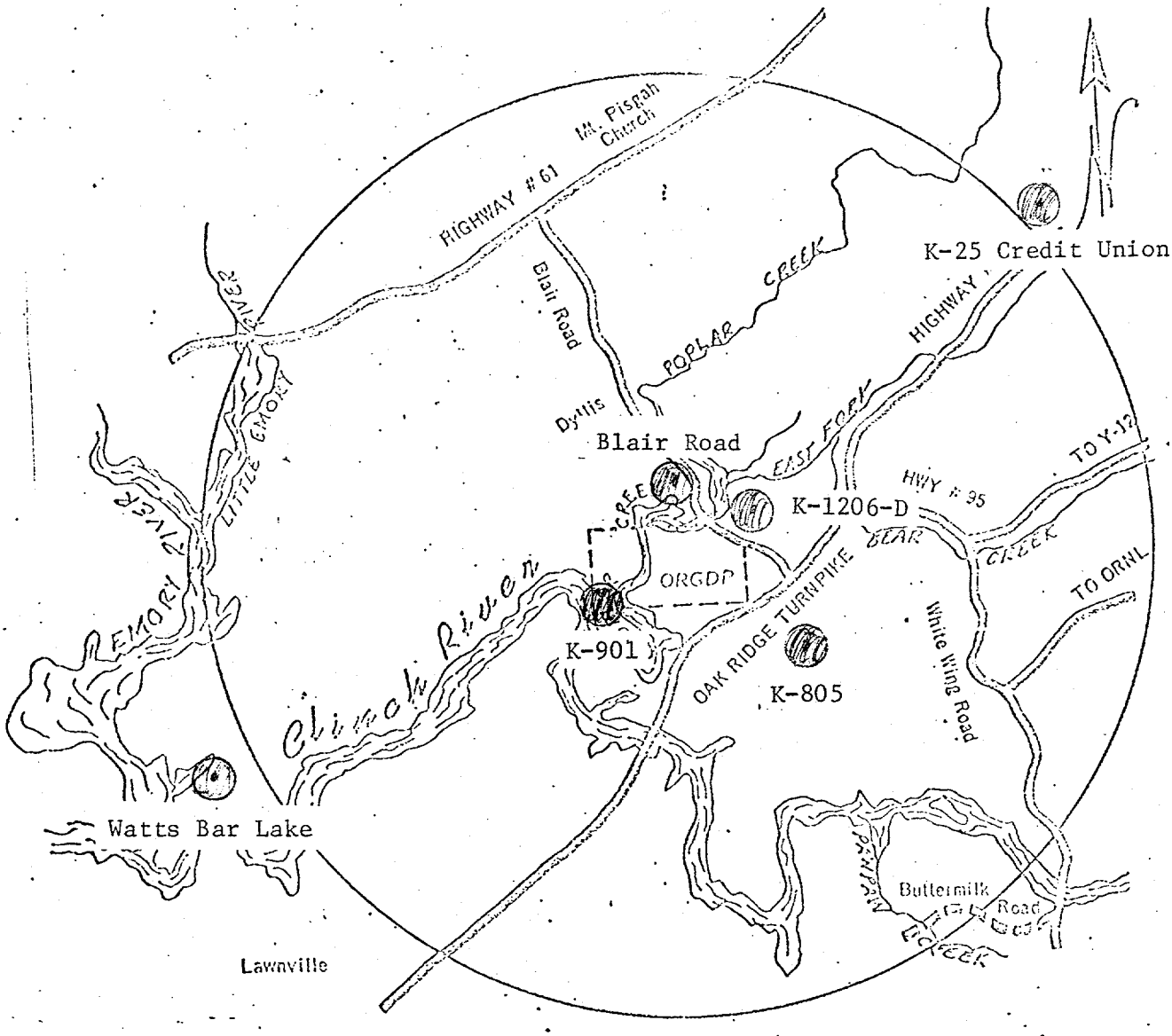
Lawnville (SW)	1	15	26
Buttermilk Road (SE)	1	17	32
Mt. Pisgah (N)	1	5	26
Highway 61 (NW)	1	13	12
Credit Union (NE)	1	28	13

[a]Normal sampling frequency—semiannual grab sample

NOTE: Applicable guides for flora and fauna have not been established.

Interpretation and Summary

Surveillance of radioactive and chemical contaminants in the ORGDP environs indicates that the levels are not significantly different from local background and other areas of East Tennessee. Only very low levels of radioactive and chemical contaminants are being released to the environment from plant operations and the resulting concentrations in the atmosphere, surface streams, flora and fauna of the Oak Ridge environment are well below established maximum permissible concentrations and intake guides for the neighboring population.



SAMPLING POINTS OF OUTSIDE ENVIRONS - ORGDP

AIR MONITORING DATA - FLUORIDES

FIGURE 1

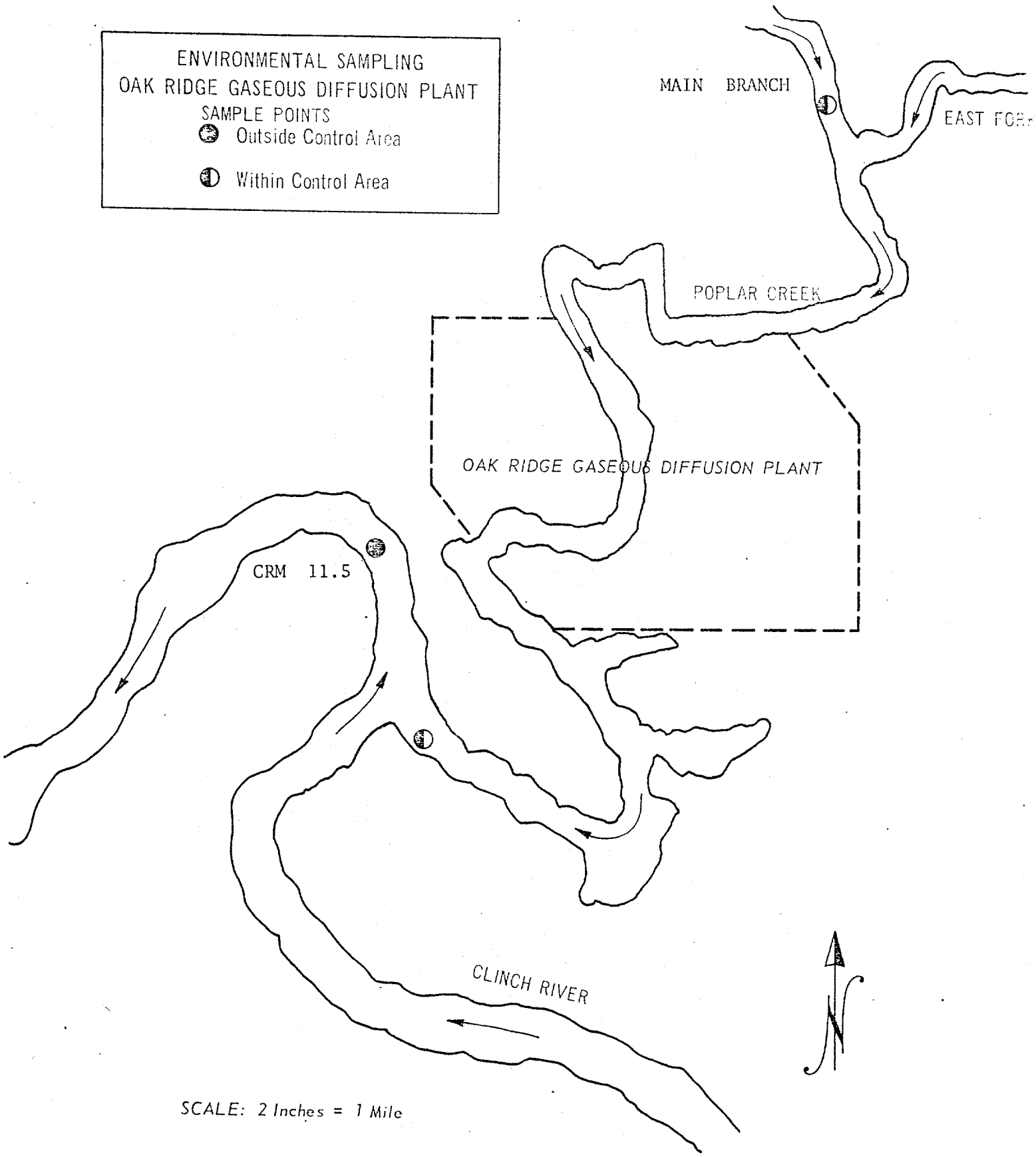
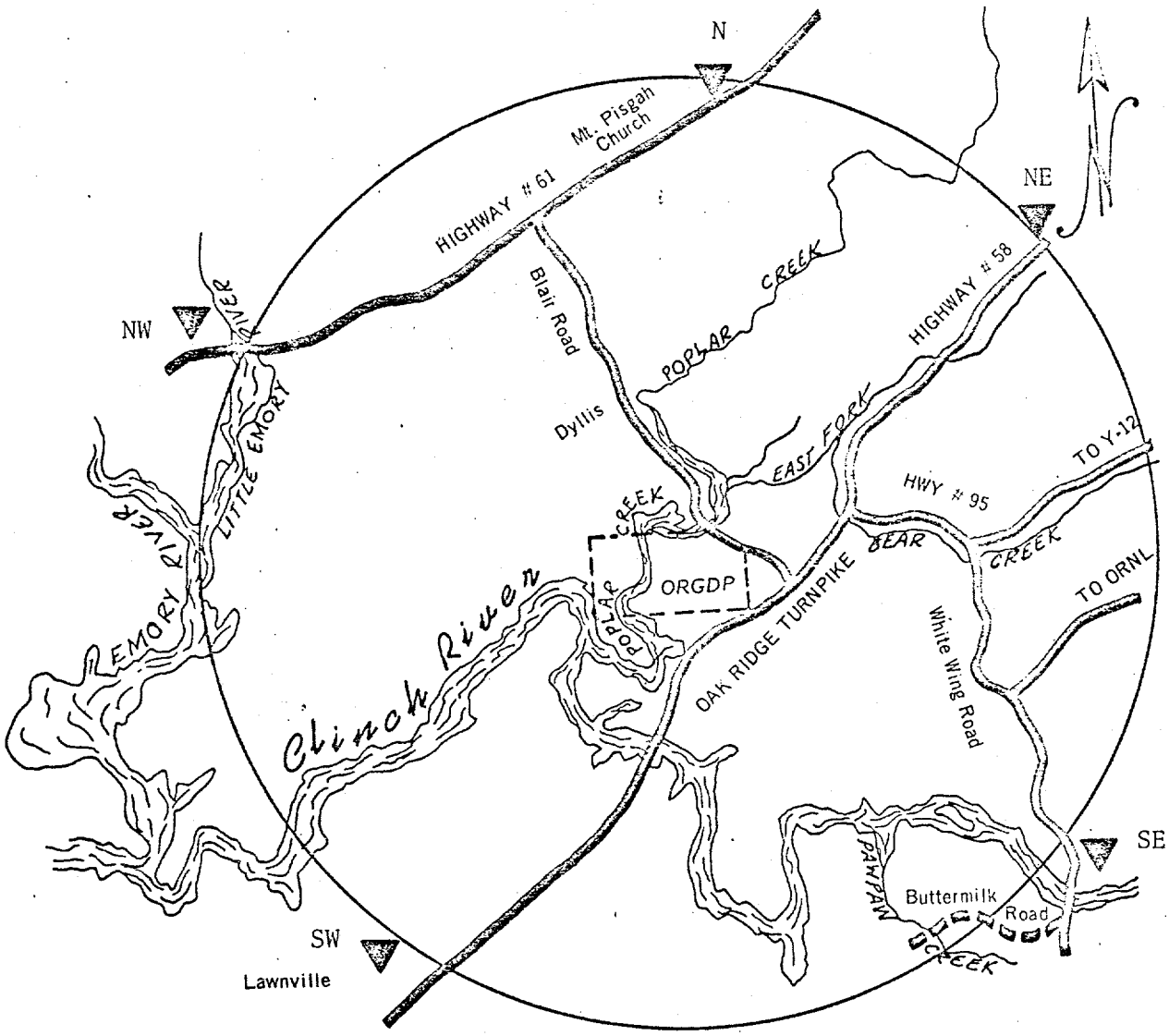

ENVIRONMENTAL SAMPLING
OAK RIDGE GASEOUS DIFFUSION PLANT
SAMPLE POINTS
Outside Control Area
Within Control Area
MAIN BRANCH
EAST FOR
POPLAR CREEK
OAK RIDGE GASEOUS DIFFUSION PLANT
CRM 11.5
CLINCH RIVER
N
SCALE: 2 Inches = 1 Mile

FIGURE 2



SAMPLING POINTS OF OUTSIDE ENVIRONS - ORGDP

▼ Sampling Location - Five Miles from Plant

FIGURE 3